

<b>Procedure: <i>Estimating Required Quantities</i></b>	
<b>Issue Date: January 9, 2001</b>	<b>Procedure ID: P-PE-160</b>
<b>Supersedes: May 5, 2000</b>	<b>Rev/Change 2.1</b>

1. **Purpose:** To establish the cost of all materials, ODCs, and labor needed for a project. Either the purpose or the procedure title should change to be consistent.
2. **Applicability:** This procedure is applicable to all contractor personnel assigned to ATISD.
3. **Responsibility:** Contractor Project Manager
4. **Support:** Engineers, Quality Assurance, Configuration Management
5. **Invoked By:**  
RFQ Response Generation P-PM-025
6. **Inputs:**

Project Records	Defined in Glossary (Appendix G)
Rough Estimates	Defined in Glossary (Appendix G)
7. **Outputs:**

Cost Summary Sheet	S-PE-300
Gantt Chart	Defined in Glossary (Appendix G)
WBS Guidance	
ODCs Worksheet	
Travel Worksheet	
8. **Procedures Invoked:**

Estimating Size	P-PE-170	Identify Risks	P-PE-150
Estimating Schedule	P-PE-180	Estimating Effort	P-PE-175
One-on-One Peer Review	P-GP-047	Labor Grades	P-PE-190
9. **External Procedures Referenced:**
10. **Procedure Steps:**
  - a) The Contractor Project Manager creates the WBS or Gantt chart (both production and support tasks) for the project. (See Note a.)
  - b) The Project Manager, with assistance of the Project Team, identifies all critical dependencies and negotiates how all affected team members will handle them. The Contractor Project Manager documents the identified critical dependencies (we suggest using an RLN).
  - c) The Contractor Project Manager groups the cost elements (identified in step a). (See Note b.)

- d) The Contractor Project Manager identifies the estimating techniques (linear, Delphi, PERT, historical, CER, parametric model, etc.) to be used for each grouping. (See Note c.)
- e) The Contractor Project Manager, with assistance from the Engineers, estimates software, hardware and document sizes using the Estimating Size procedure (P-PE-170).
- f) The Contractor Project Manager, with assistance from Quality Assurance and Configuration Management, estimates effort using the Estimating Effort Procedure (P-PE-175).
- g) The Contractor Project Manager estimates schedule using the Estimating Schedule Procedure (P-PE-180).
- h) The Contractor Project Manager chooses the staffing profile using the Staffing Profile Procedure.
- i) The Contractor Project Manager allocates the labor grades using the Labor Grades Procedure (P-PE-190).
- j) The Contractor Project Manager works with Purchasing to obtain quotes for the items listed below:
  - ?? Materials
  - ?? ODCs
  - ?? Travel
- k) The Contractor Project Manager works with the project's networking team to identify computer equipment and capital equipment (hardware and software) that will be needed for the potential new project.
- l) The Contractor Project Manager works with Facilities or Government Contracting Officer to identify office and lab space, and telephone and data lines that will be needed by the potential new project.
- m) The Contractor Project Manager needs to calculate and document the estimated cost, terms, duration and start date of the warranty effort.
- n) The Contractor Project Manager, with assistance from Costing Analyst (Pricers), applies approved rates for labor grades to convert labor effort to direct labor cost. (Often an average labor rate is used based on some mix of labor grades.)
- o) Costing Analysts (Pricers) apply approved rates for overhead, fringe, G&A, etc. to convert unburdened costs to loaded costs. (This loading accounts for indirect costs. Note that some bids require certain items to be costed as direct instead of indirect.)
- p) Costing Analysts, in conjunction with Upper Management, apply the fee percentage to the total cost to obtain the bid price.
- q) The Contractor Project Manager documents all inputs, assumptions, questions, estimates and cost (S-PE-300). (See Notes f and g.)
- r) The Contractor Project Manager arranges to have the estimate One-on-One Peer Reviewed (P-GP-047) by a peer or estimating expert and makes any needed adjustments.
- s) The Contractor Project Manager places all data associated with the estimates and cost in the Project Records.

**Notes:**

- a) This step identifies the cost elements (tasks - WBS elements). It uses previously generated outputs such as: requirements specification, operational concept, architecture, top level design, planned reviews and the production process [steps, activities]. In some cases, the Government specifies the upper levels of the WBS.

The partitioning of the WBS should reflect how you will estimate the project, the way you plan to manage and track it, and how you will allocate work to different individuals, groups, and subcontractors. The major tasks should be subdivided into well-defined sub-tasks having objective milestones. These sub-tasks should be small enough to permit adequate visibility. A good task partitioning should provide milestones about two to four weeks apart. Riskier tasks should be subdivided more finely. For example, tasks assigned to a new, unproven Subcontractor should be more finely subdivided than those assigned to more experienced teams.

A Gantt chart may be used instead of a WBS. This is a decision to be made by the Contractor Project Manager based on the project.

- b) Grouping can be by “sameness” or by “relatedness”. For example: all screens, or all activities (Analysis, Design, Production, Test) “covered” by a parametric model such as COCOMO.
- c) Refer to the SAIC Software Estimating Techniques course or the SAIC Cost Estimating Manual for help with any of the estimating steps. It is recommended that if this is a new area with which we have little experience, two methods of estimation should be used.
- d) Using the Risk Worksheet and risk evaluation matrix, add an amount to the cost to one or more tasks as needed to provide a risk reserve. This amount is usually a percentage of the estimated loaded cost. (Upper Management specifies the percentage.) Alternately, in some cases, the reserve is estimated based on the planned actions (avoidance, mitigation or acceptance).
- e) The team's understanding of the requirements, deliverables, product design, and production process change drastically and rapidly during a proposal. This means that the estimator should devote special attention to: (1) documenting each estimate (including a date/time stamp!), and (2) maintaining traceability between these different estimates. The reason for (1) is to know what was and was not included in a given estimate, and what the assumptions were. The reason for (2) is to be able to revert or reconstruct previous estimates quickly and accurately.
- f) In this procedure all roles work together to arrive at the final price. The Engineers estimate the resources and write the Bill of Materials; the Pricers figure out the cost; and the Managers set the price.